

U.S. Patent Application No. 10/047,440  
Amendment dated January 30, 2004  
Reply to Office Action dated November 6, 2003

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

Claim 1 (withdrawn): A process for producing a valve metal pentoxide comprising:

reacting an aqueous fluoro-solution comprising a valve metal-fluoro compound with an ammonia containing solution under controlled temperature, pH and residence time conditions to precipitate valve metal pentoxide precursor;

converting the valve metal pentoxide precursor to valve metal pentoxide; and

separating and recovering the valve metal pentoxide.

Claim 2 (withdrawn): The process of claim 1 wherein the step of reacting the valve metal-fluoro compound with an ammonia containing solution comprises:

introducing an aqueous fluoro-solution comprising a valve metal-fluoro compound into a first vessel maintained at a first temperature;

introducing a first ammonia solution into the first vessel and mixing the first ammonia solution and the aqueous fluoro-solution to obtain a first mixture at a first pH to react the first ammonia solution and the aqueous fluoro-solution and initiate precipitation of valve metal pentoxide precursor;

transferring said first mixture into a second vessel maintained at a second temperature and a second pH to produce a second mixture and mixing to continue precipitation of valve metal pentoxide precursor.

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Claim 3 (withdrawn): The process of claim 2 wherein the step of reacting the valve metal-fluoro compound with an ammonia containing solution further comprises:

transferring said second mixture into a third vessel maintained at a third temperature and a third pH and mixing to allow precipitation of the valve metal pentoxide precursor to continue.

Claim 4 (withdrawn): The process of claim 1 wherein the valve metal is tantalum and the process for producing tantalum pentoxide comprises:

reacting an aqueous fluoro-solution comprising a tantalum-fluoro compound with an ammonia containing solution under controlled temperature, pH and residence time conditions to precipitate tantalum pentoxide precursor;

converting the tantalum pentoxide precursor to tantalum pentoxide; and

separating and recovering the tantalum pentoxide.

Claim 5 (withdrawn): The process of claim 4 wherein the step of reacting the tantalum-fluoro compound with an ammonia containing solution comprises:

introducing a first ammonia solution into the first vessel and mixing the first ammonia solution and the aqueous fluoro-solution to obtain a first mixture at a first pH and to react the first ammonia solution and the aqueous fluoro-solution and initiate precipitation of tantalum pentoxide precursor;

transferring said first mixture into a second vessel maintained at a second temperature and a second pH to produce a second mixture and mixing to continue precipitation of tantalum pentoxide precursor.

Claim 6 (withdrawn): The process of claim 5 wherein the step of reacting the tantalum-fluoro compound with an ammonia containing solution further comprises:

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transferring said second mixture into a third vessel maintained at a third temperature and a third pH and mixing to allow precipitation of the tantalum metal pentoxide precursor to continue.

Claim 7 (withdrawn): The process of claim 6 further comprising admixing a complexing agent with an aqueous fluoro-solution.

Claim 8 (withdrawn): The process of claim 6, wherein the converting step further comprises calcining the tantalum pentoxide precursor at a temperature greater than or equal to 790° C.

Claim 9 (withdrawn): The process of claim 1 wherein the valve metal is niobium and the process for producing niobium pentoxide comprises:

reacting an aqueous fluoro-solution comprising a niobium-fluoro compound with an ammonia containing solution under controlled temperature, pH and residence time conditions to precipitate niobium pentoxide precursor;

converting the niobium pentoxide precursor to niobium pentoxide; and

separating and recovering the niobium pentoxide.

Claim 10 (withdrawn): The process of claim 9 wherein the step of reacting the niobium-fluoro compound with an ammonia containing solution comprises:

introducing a first ammonia solution into the first vessel and mixing the first ammonia solution and the aqueous fluoro-solution to obtain a first mixture at a first pH and to react the first ammonia solution and the aqueous fluoro-solution and initiate precipitation of niobium pentoxide precursor;

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transferring said first mixture into a second vessel maintained at a second temperature and a second pH to produce a second mixture and mixing to continue precipitation of niobium pentoxide precursor.

Claim 11 (withdrawn): The process of claim 10 wherein the step of reacting the niobium-fluoro compound with an ammonia containing solution further comprises:

transferring said second mixture into a third vessel maintained at a third temperature and a third pH and mixing to allow precipitation of the niobium metal pentoxide precursor to continue.

Claim 12 (withdrawn): The process of claim 11 further comprising admixing a complexing agent with the aqueous fluoro-solution.

Claim 13 (withdrawn): The process of claim 11 wherein the converting step further comprises calcining the niobium pentoxide precursor at a temperature greater than or equal to 650° C.

Claim 14 (withdrawn): A calcined niobium pentoxide powder characterized by having:  
a BET surface area less than or equal to 3 m<sup>2</sup>/g; and  
a packed bulk density of greater than 1.8 g/cc.

Claim 15 (withdrawn): The calcined niobium pentoxide powder of claim 14 wherein the BET surface area is less than, or equal to, 1 m<sup>2</sup>/g.

Claim 16 (withdrawn): The calcined niobium pentoxide powder of claim 14 wherein the packed bulk density is greater than or equal to 2.1 g/cc.

Claim 17 (withdrawn): A calcined niobium pentoxide powder characterized by having:  
a BET surface area of greater than or equal to 2 m<sup>2</sup>/g; and  
a packed bulk density of less than or equal to 1.8 g/cc.

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Claim 18 (withdrawn): The calcined niobium pentoxide powder of claim 17 wherein the BET surface area is greater than or equal to  $6 \text{ m}^2/\text{g}$ .

Claim 19 (withdrawn): The calcined niobium pentoxide powder of claim 17 wherein the packed bulk density is less than or equal to  $1.0 \text{ g/cc}$ .

Claim 20 (original): A calcined tantalum pentoxide powder characterized by having:

a BET surface area of less than or equal to  $3 \text{ m}^2/\text{g}$ ; and

a packed bulk density of greater than  $3.0 \text{ g/cc}$ .

Claim 21 (original): The calcined tantalum pentoxide powder of claim 20 wherein the BET surface area is less than or equal to  $0.4 \text{ m}^2/\text{g}$ .

Claim 22 (original): The calcined tantalum pentoxide powder of claim 20 wherein the packed bulk density is greater than or equal to  $4.0 \text{ g/cc}$ .

Claim 23 (original): A calcined tantalum pentoxide powder characterized by having:

a BET surface area of greater than or equal to  $3 \text{ m}^2/\text{g}$ ; and

a packed bulk density of less than or equal to  $3.0 \text{ g/cc}$ .

Claim 24 (original): The calcined tantalum pentoxide powder of claim 23 wherein the BET surface area is greater than or equal to  $11 \text{ m}^2/\text{g}$ .

Claim 25 (original): The calcined tantalum pentoxide powder of claim 23 wherein the packed bulk density is less than or equal to  $1.1 \text{ g/cc}$ .

Claim 26 (withdrawn): A valve metal pentoxide precursor characterized by having a line broadened d-value under x-ray analysis at:

$6 \pm 0.3$ ;

$3 \pm 0.2$ ; and

$1.8 \pm 0.1$ .

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Claim 27 (withdrawn): The valve metal pentoxide precursor of claim 26 wherein the valve metal is niobium and the niobium pentoxide precursor is further characterized by having:

a BET surface area of less than or equal to  $3 \text{ m}^2/\text{g}$ ; and a Fluoride content of less than or equal to 500 ppm.

Claim 28 (withdrawn): The niobium pentoxide precursor of claim 27 further characterized by having a Fluoride content of less than or equal to 150 ppm.

Claim 29 (withdrawn): The valve metal pentoxide precursor of claim 26 wherein the valve metal is niobium and the niobium pentoxide precursor is further characterized by having:

a BET surface area of greater than  $3 \text{ m}^2/\text{g}$ ; and a Fluoride content of less than or equal to 500 ppm.

Claim 30 (withdrawn): The niobium pentoxide precursor of claim 29 further characterized by having a Fluoride content of less than or equal to 150 ppm.

Claim 31 (withdrawn): The valve metal pentoxide precursor of claim 26 wherein the valve metal is tantalum and the tantalum pentoxide precursor is further characterized by having:

a BET surface area of less than or equal to  $3 \text{ m}^2/\text{g}$ ; and a Fluoride content of less than or equal to 500 ppm.

Claim 32 (withdrawn): The tantalum pentoxide precursor of claim 31 further characterized by having a Fluoride content of less than or equal to 150 ppm.

Claim 33 (withdrawn): The valve metal pentoxide precursor of claim 26 wherein the valve metal is tantalum and the tantalum pentoxide precursor is further characterized by having:

a BET surface area of greater than  $3 \text{ m}^2/\text{g}$ ; and a Fluoride content of less than or equal to 500 ppm.

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Claim 34 (withdrawn): The tantalum pentoxide precursor of claim 33 further characterized by having a Fluoride content of less than or equal to 150 ppm.

Claim 35 (withdrawn): A process for producing valve metal pentoxides comprises:  
reacting an aqueous solution comprising a valve metal compound with a base solution under controlled temperature, pH and residence time conditions to precipitate valve metal pentoxide precursor;

converting the valve metal pentoxide precursor to valve metal pentoxide; and  
separating and recovering the valve metal pentoxide.

Claim 36 (previously presented): The calcined tantalum pentoxide powder of claim 20, wherein the BET surface area is from  $0.3 \text{ m}^2/\text{g}$  to  $3 \text{ m}^2/\text{g}$ .

Claim 37 (previously presented): The calcined tantalum pentoxide powder of claim 20, wherein the BET surface area is less than or equal to  $0.75 \text{ m}^2/\text{g}$ .

Claim 38 (previously presented): The calcined tantalum pentoxide powder of claim 20, wherein the packed bulk density is from greater than  $3.0 \text{ g/cc}$  to  $4 \text{ g/cc}$ .

Claim 39 (previously presented): The calcined tantalum pentoxide powder of claim 20, wherein the packed bulk density is greater than or equal to  $3.8 \text{ g/cc}$ .

Claim 40 (previously presented): The calcined tantalum pentoxide powder of claim 20, wherein said calcined tantalum pentoxide powder has a size such that 70% or less of said powder has a size less than 1 micrometer.

Claim 41 (previously presented): The calcined tantalum pentoxide powder of claim 20, wherein said calcined tantalum pentoxide powder has a size greater than 1 micrometer.

Claim 42 (previously presented): The calcined tantalum pentoxide powder of claim 20, wherein said calcined tantalum pentoxide powder comprises a fine single crystallite shape.

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Claim 43 (previously presented): The calcined tantalum pentoxide powder of claim 20, wherein said calcined tantalum pentoxide powder comprises spherical agglomerates.

Claim 44 (previously presented): The calcined tantalum pentoxide powder of claim 20 further comprising a fluoride content of less than or equal to 500 ppm.

Claim 45 (previously presented): The calcined tantalum pentoxide powder of claim 20 further comprising a fluoride content of less than or equal to 150 ppm.

Claim 46 (currently amended): The calcined tantalum pentoxide powder of claim 23, wherein the BET surface area is from  $3.0 \text{ m}^2/\text{g}$  to ~~47~~ 11  $\text{m}^2/\text{g}$ .

Claim 47 (previously presented): The calcined tantalum pentoxide powder of claim 23, wherein the BET surface area is greater than or equal to  $7.0 \text{ m}^2/\text{g}$ .

Claim 48 (currently amended): The calcined tantalum pentoxide powder of claim 23, wherein the packed bulk density is from ~~0.9~~ 0.75 g/cc to  $3.0 \text{ g/cc}$ .

Claim 49 (previously presented): The calcined tantalum pentoxide powder of claim 23, wherein the packed bulk density is from  $1.1 \text{ g/cc}$  to  $3.0 \text{ g/cc}$ .

Claim 50 (previously presented): The calcined tantalum pentoxide powder of claim 23, wherein the packed bulk density is less than or equal to  $0.75 \text{ g/cc}$ .

Claim 51 (previously presented): The calcined tantalum pentoxide powder of claim 23, wherein said calcined tantalum pentoxide powder has a size such that 70% or less of said powder has a size less than 1 micrometer.

Claim 52 (previously presented): The calcined tantalum pentoxide powder of claim 23, wherein said calcined tantalum pentoxide has a size such that greater than 9% of said calcined tantalum pentoxide powder has a size less than 1 micrometer.



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Claim 53 (previously presented): The calcined tantalum pentoxide powder of claim 23, wherein said calcined tantalum pentoxide powder comprises a fine single crystallite shape.

Claim 54 (previously presented): The calcined tantalum pentoxide powder of claim 23, wherein said calcined tantalum pentoxide powder comprises spherical agglomerates.

Claim 55 (previously presented): The calcined tantalum pentoxide powder of claim 23, further comprising a fluoride content of less than or equal to 500 ppm.

Claim 56 (previously presented): The calcined tantalum pentoxide powder of claim 23, further comprising a fluoride content of less than or equal to 150 ppm.